INFORMATION QUALITY MANAGEMENT:

The Next Frontier
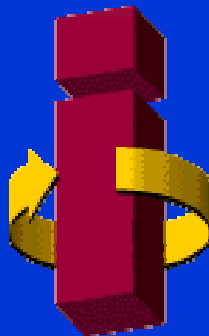
ArchitecturePlus

Washington, DC

March, 2000

by:

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Larry P. English
President and Principal

Mr. English is an internationally recognized speaker, educator, author and consultant in information and knowledge management and information quality improvement. He also provides consulting and education in information stewardship, strategic information visioning, information technology evaluation, information resource management and data administration, data modeling and facilitation, and value-centric application development methods. Mr. English has developed the Total Quality data Management (TQdM®) methodology applying Kaizen® quality principles to information quality management. He chairs Information Quality Conferences around the world.

Prior to founding INFORMATION IMPACT INTERNATIONAL, Inc. (www.infoimpact.com), Brentwood, TN, over twelve years ago, Mr. English was Vice President of an international IRM consulting firm. Before that, he was manager of systems development and then for information management with a large publishing firm. Before positions as Senior Instructor for a computer manufacturer and Information Systems Training Coordinator for a major insurance firm, Mr. English began his career with Sears, Roebuck, and Co., as a programmer and systems analyst.

DAMA awarded him the 1998 "Individual Achievement Award" for his contributions to the field of information resource management. Mr. English has served as an Adjunct Associate Professor in computer science. He is a member and a strategic business partner of the American Society for Quality (ASQ). Mr. English has been an active member of various ANSI (American National Standards Institute) standards committees, and he is an editorial advisor for *DM Review*.

A magna cum laude graduate of Hardin-Simmons University, Mr. English holds a Masters Degree from the Southern Baptist Theological Seminary where he was a Luther Rice Scholar and a Garrett Fellow. He is listed in Outstanding Young Men in America and Who's Who Worldwide. He has provided consulting and educational services in more than 25 countries on five continents to such organizations as Aera Energy, Air Canada, American Express, Belgacom, Boeing, British Telecom, Capital Bank, Coca-Cola Foods, Dow Chemical, Eastman Kodak, Eli Lilly, the FDIC, Hewlett-Packard, The Hartford, IBM, L. L. Bean, NTT DATA, Optical Fibres, Sprint, Telenor, UNUM Life Insurance Co., the U.S. Navy, Western Health Alliance and Weyerhaeuser.

A frequent keynote speaker, Mr. English writes the monthly "Plain English on Data Quality" column for *DM Review,* and is the author of the highly acclaimed *Improving Data Warehouse and Business Information Quality*, now being translated into Japanese, and numerous articles for publications in the US and Europe.

INFORMATION QUALITY MANAGEMENT
Agenda

1. **Information Quality: What and Why**

2. **Assessing Business Information Quality**

3. **Quantifying Nonquality Information Costs**

4. **Improving Information *Product* Quality**

5. **Improving Information *Process* Quality**

6. **Implementing and Sustaining an Information Quality Improvement Environment**

COST OF NONQUALITY DATA?

What is your estimate of the costs of non-quality data to your organization, *as a percent of enterprise revenue? (Non-quality data costs include time and materials in: recovery from process failure, rework, work-arounds, wasted materials, data verification to clean up, redundant computing resources used, customer compensation, etc. as a result of missing or inaccurate data.)*

❑ **0 – <1%**   ❑ **1 – <2.5%**   ❑ **2.5 – <5%**   ❑ **5 – <10%**
❑ **10 – <15%**   ❑ **15 – <20%**   ❑ **>20%**

This estimate is based on:

❑ **Some measurement, or**   ❑ **A guess**

1.
Defining Information Quality:
What and Why
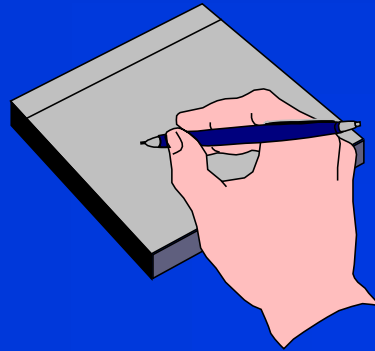
"Beauty is in the eye of the beholder" *. . . . .* Margaret Hungerford

Improving Data Warehouse and Business Information Quality, Chapter 2, pp 15 - 30

REDUNDANT SYSTEMS DEVELOPMENT COSTS

10-year costs of 43 redundant application programs & files

$4,493,500

*10-year cost of single architected program and database file

$171,500*

$0 $1,000,000 $2,000,000 $3,000,000 $4,000,000 $5,000,000
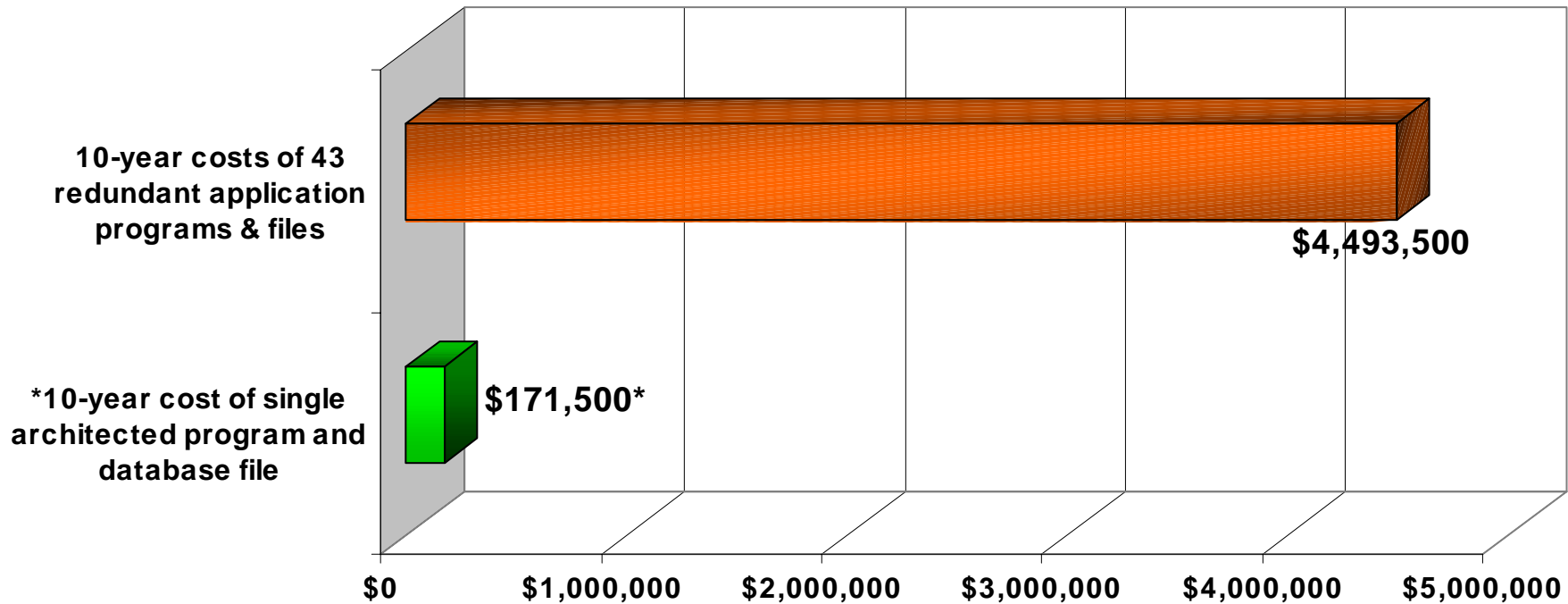
- **Double cost to model data across enterprise**
- **Double cost to build shared application**
- **Double cost of operating a single shared database compared with 43 individual redundant applications**
- **40% wage increase to information producer because of higher value of work**

COSTS OF I / S QUALITY AS A PERCENT OF I / S BUDGET

Organization with no information management process

Organization with mature information management process

Interface Maintenance Costs: 48-63%

Savings: 43-58%

- **❶** Direct costs (interface maintenance)
- **❷** Cost of integrated information environment
- **❸** Savings

5%

50.0%
40.0%
30.0%
20.0%
10.0%
0.0%

1

2
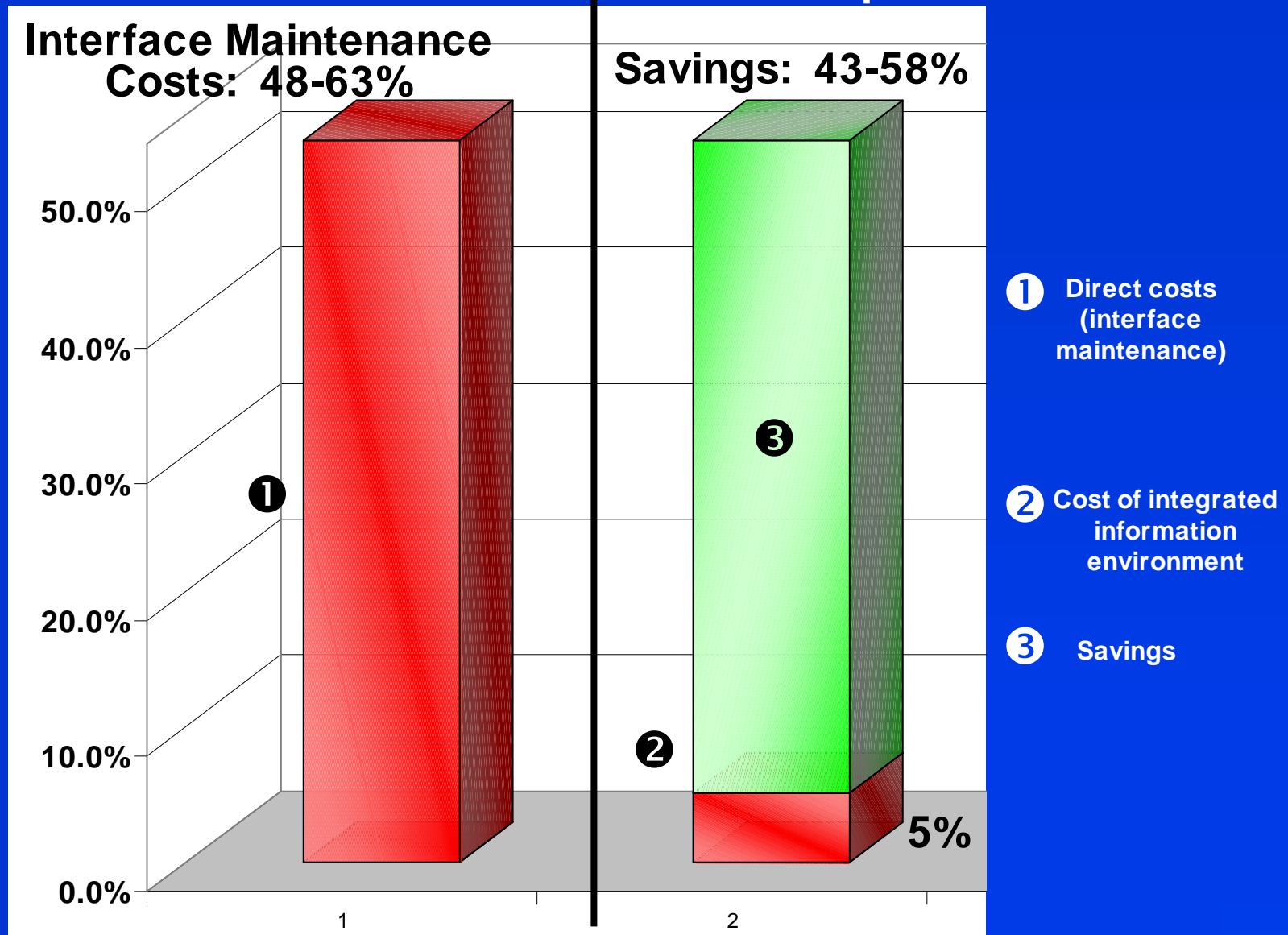
COST OF NONQUALITY INFORMATION
Perception and Reality

"Our data quality isn't so bad. We haven't heard any complaints from users."

-Data Quality manager

$500 M information scrap & rework (7%)

$500 M 1998 profit (7%)

"Legitimate" costs $6 Billion

$7 Billion Revenue
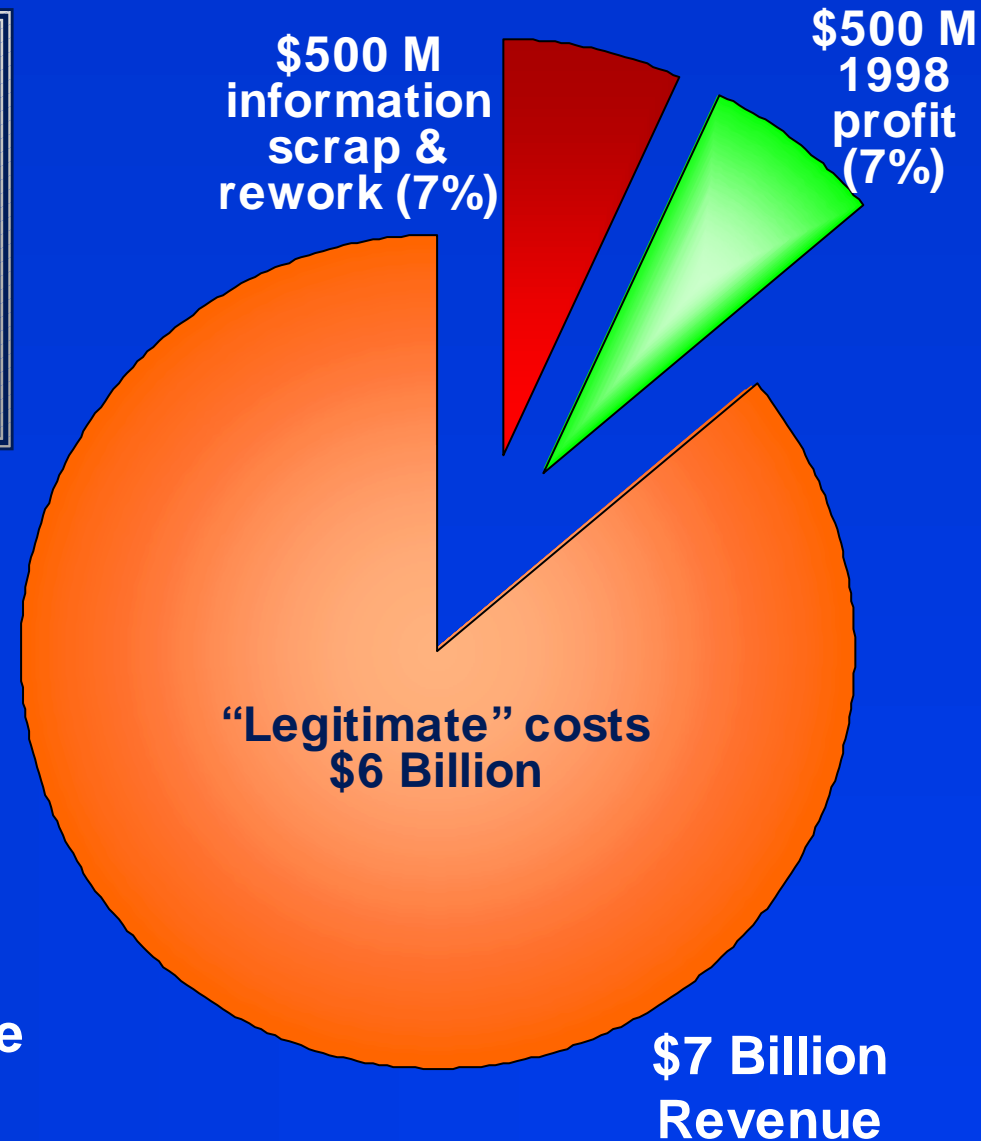
Cost of nonquality information case study:

Labor costs *alone* in Information scrap and rework = 7% of revenue

DIRECT COSTS OF QUALITY AS A PERCENT OF REVENUE

Organization with no quality improvement process

Organization with mature quality improvement process

Scrap / rework 20-30%

Savings 17-25%

35%
30%
25%
20%
15%
10%
5%
0%

❶

❸

❷

CPI Cost 2.5-5%

Source: P. Crosby, *Quality is Free*
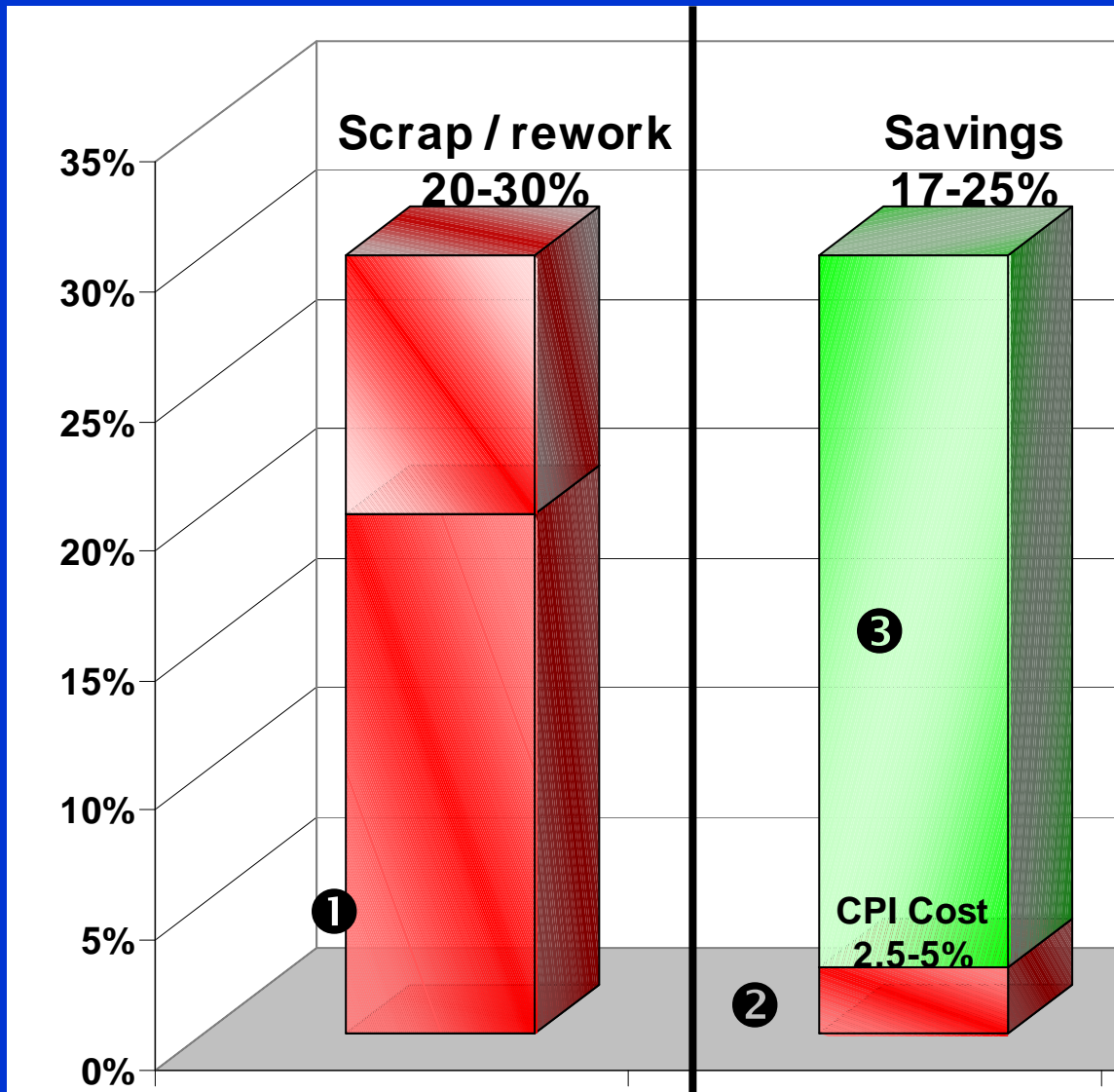
* **Does not include opportunity loss**

❶ **Direct costs (inc: non-recoverable, re-work, cust complaint handling)**

❷ **Cost of defect prevention program**

❸ **Savings**

"In 1998, 74% of all IT projects overran or failed, resulting in almost $100 billion in unexpected costs."

The Standish Group, Based on a 1998 survey of over 7,000 IT projects

Failure 28%

Success 26%

Overrun 46%
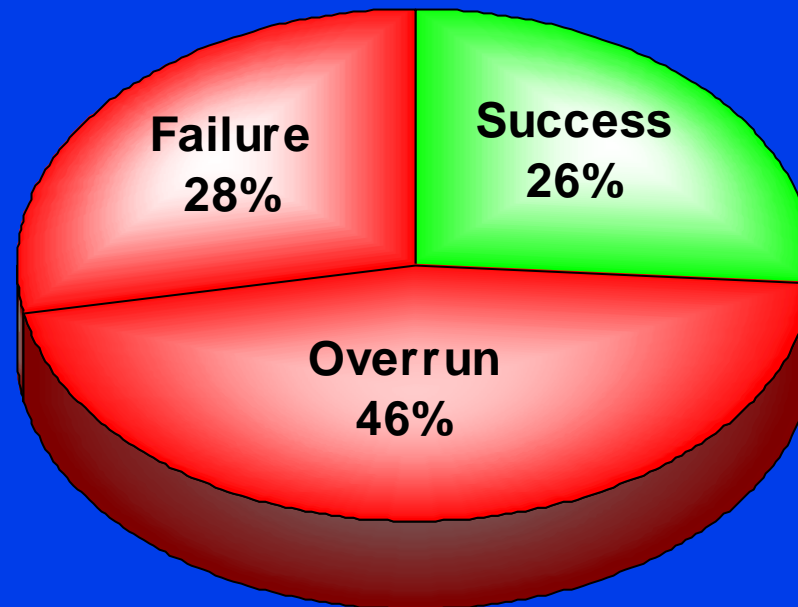
HOW MANY OF YOUR CUSTOMERS WITH A COMPLAINT WILL *NOT* BUY FROM YOU AGAIN?

Bar chart comparing percentages of customers who will not buy again, grouped by complaint resolution status, split into Minor complaints and Major complaints:

Category	Minor complaints	Major complaints
Complaints Resolved Quickly	5%	18%
Complaints Resolved	30%	46%
Complaints Not Resolved	54%	81%
Non Complainers	63%	91%

Legend: Minor complaints, Major complaints
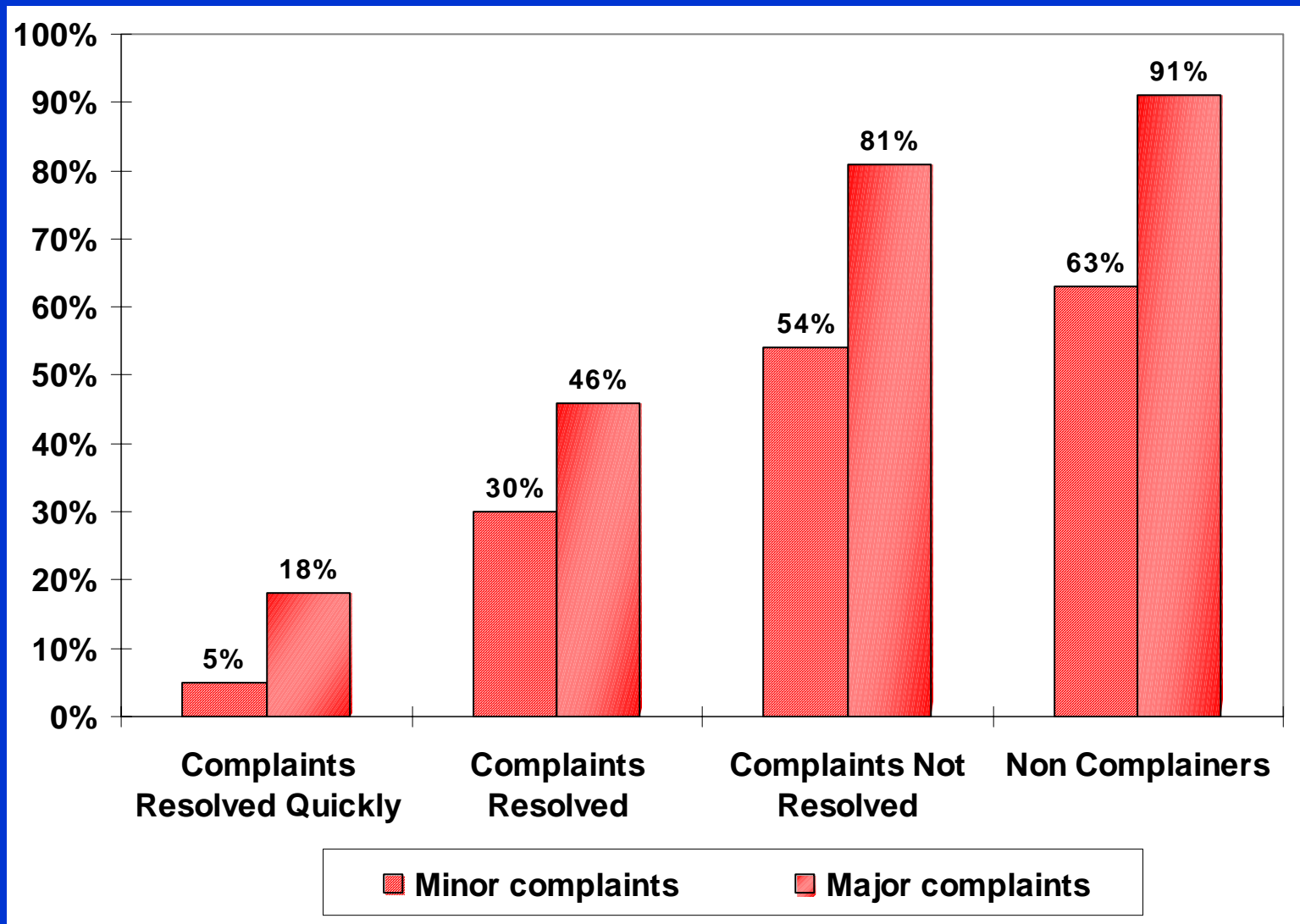
❑ **Only 4% of customers with a complaint will tell you**
❑ **People with complaints will tell 8-10 other people**

Source: TARP

INDUSTRIAL AGE MATURITY
Total Quality Management

"Make It"

"Make It *Right*"

2000

**1947   W. Edwards Deming
"14 Points of Management
Transformation"**

**1776
Adam Smith
Wealth of Nations
"Specialization
of labor"
Principles**

**1769
James Watt
Steam Engine**

Technology

Revised Principles
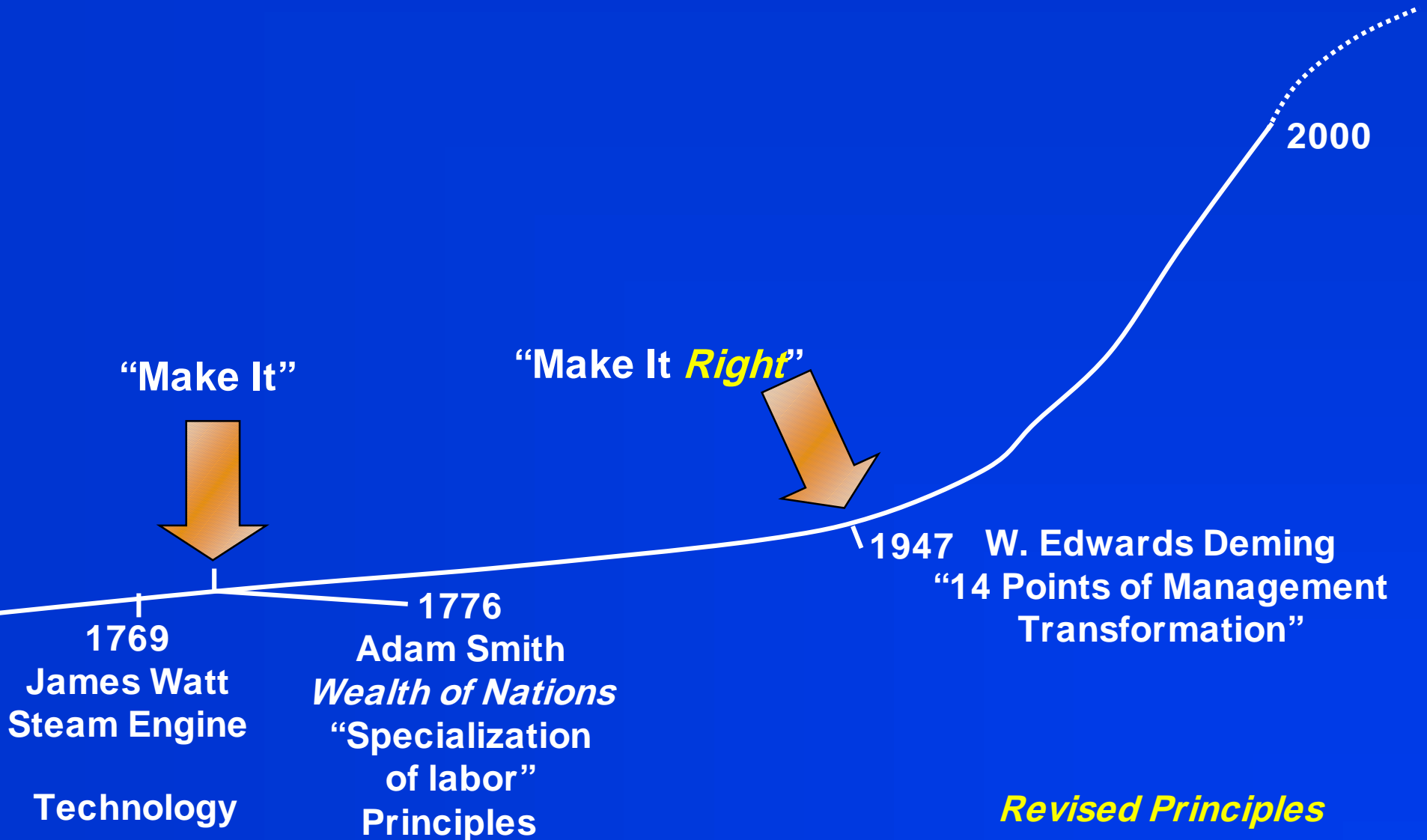
INFORMATION AGE MATURITY
Total Quality Data Management
The New Frontier

"Compute It Right"

"Compute It"

2000

1993
Michael Hammer
Reengineering
Cross-functional
"Business Process"
(Value Chain)

Larry P. English
TQdM®
"Information
Value Chain"
14 Points of IQ

1946
ENIAC Online

1947
(Deming)

Technology

Principles?
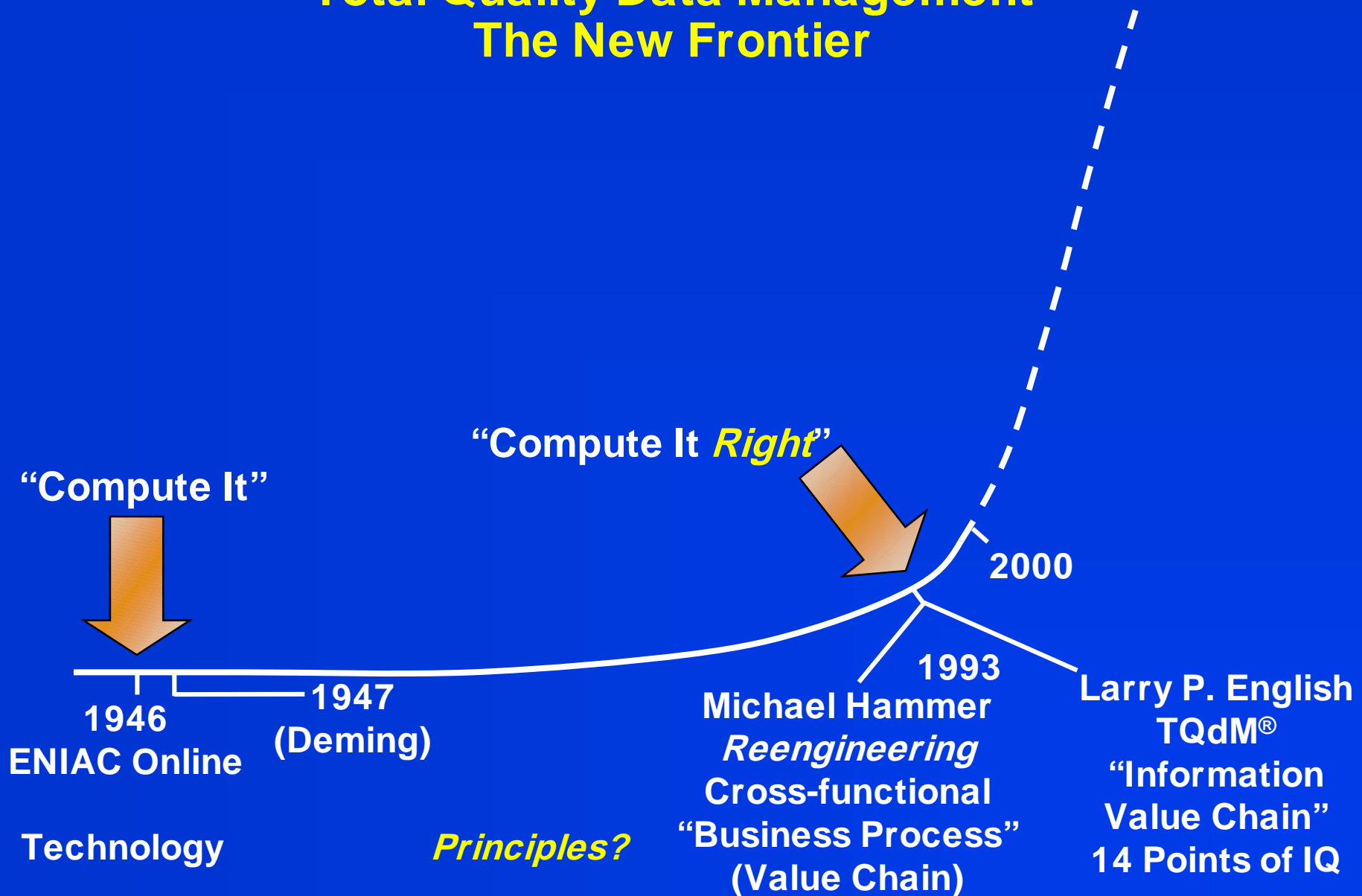
INFORMATION QUALITY

> "Consistently
>
> meeting
>
> knowledge worker and end-customer
>
> expectations"
>
> through information and information services
>
> Larry English, TQdM®

Quality of:

- **Data Definition (*all* business metadata)**
- **Data Content**
- **Data Presentation**

QUALITY PRINCIPLES

❑ **Customer focus**
- **Market focus**
- **Customer satisfaction**
- **Partnership**

❑ **Process improvement**
- **Process definition**
- **Product specification (customer)**
- **Team work**
- **Continuous process improvement (CPI) and 6 Sigma**
- **Business process re-engineering (BPR)**

❑ **Scientific methods**
- **Statistical quality control**
- **PDCA (Shewhart cycle)**
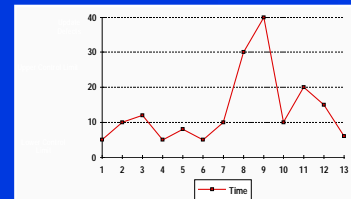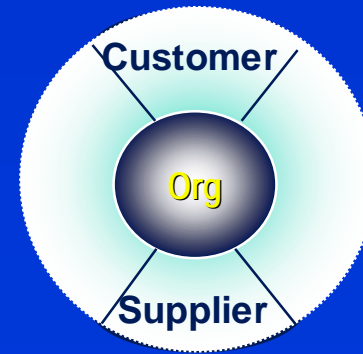
KAIZEN® : THE ART OF CONTINUOUS IMPROVEMENT

> "Kaizen® simply means continuous improvement involving everybody in the organization. I think the two key words, one is improvement and the other is continuous. And it is possible for people to make improvement once, but to keep people making improvements year after year is another challenge"
>
> *Masaaki Imai, Founder, Kaizen Institute*

❏ **Kaizen objectives: To continually improve everything in the business by encouraging everybody to take responsibility for the process**

Kaizen is a registered trademark of the Kaizen Institute

INFORMATION PRODUCTS AND INFORMATION CUSTOMERS

Process Owner

Information Producer

Data Intermediary

Information Producer

Supplier-Customer Relationship

Knowledge Workers *

Data Material

Create

Create

Update

Information Product

Retrieve

Data Material

Data Product

***There is no concept of "users" if we subscribe to information quality**

Data Resource

Repository / Info Directory

Information definition and specification

2.
Assessing Information Quality

"You cannot measure what is not defined."

Paul Strassman, *Information Payoff*

"One accurate measurement is worth a thousand expert opinions"

Grace Hopper (1906-1992), Admiral, U.S. Navy

TOTAL QUALITY data MANAGEMENT (TQdM®) Methodology Overview

TQdM® is *not* a program; rather, continuous improvement of:

1. *Application and data development processes*
2. *Business processes*

By integrating *quality* management *beliefs*, *principles* and *methods* into the *culture*

P6
Establish the Information Quality Environment

P1 — Assess Data Definition & Information Architecture Quality

Data Definition Quality Assessment

P2 — Assess Information Quality

Information Quality Assessment

P3 — Measure Nonquality Information Costs

P4 — Reengineer and Cleanse Data

Cleansed Data

Information Value / Costs

P5 — Improve Information Process Quality

Information Quality Improvements

TQdM® METHODOLOGY PROCESS P1:
Assess Data Definition and Information Architecture Quality

Begin

S1.1

Identify Data Definition Quality Measures

S1.2

Identify Information Group to Assess

S1.3

Identify Information Stakeholders

S1.4

Assess Data Definition Technical Quality

S1.5

Assess Information Architecture & DB Design Quality

S1.6

Assess Customer Satisfaction with Data Definition

Technical Data Definition Quality Assessment
S3.1, S4.1, S5.1

Assessment Information Group
S2.1

Information Architecture and Database Assessment
S3.1, S4.1, S5.1

Data Definition Customer Satisfaction Assessment
S3.1, S4.1, S5.1

DATA DEFINITION QUALITY MEASURES

Meaningful enterprise data standards / guidelines

❑ Conformance to *meaningful* enterprise standards

❑ Meaningful business names, terms and abbreviations

❑ Consistency of data names

❑ Clear, precise, complete, consensus definition

❑ Singularity of definition

❑ Complete, exact definition of domain values

❑ Completeness, correctness and usefulness of business rules

Understandable to knowledge workers and information producers using customer satisfaction surveys

ATTRIBUTE DEFINITION QUALITY CHECKLIST

❏ **The definition describes a *specific kind of fact* that can be used to add value to the enterprise**

❏ **The description of *only one* type of fact**

❏ **The attribute is an *inherent* characteristic of the entity type**

❏ **The business terms, entity names, or other attribute names used in the definition have already been defined**

❏ **The description of *one and only* one entity type or subtype**

❏ **The illustration of example values**

❏ **A value of the attribute is complete and unambiguous**

❏ **The attribute values are mutually exclusive**

❏ **A derived attribute definition describes the formula or calculation**

❏ **In an attribute is derived, all base attributes from which it is calculated are named and defined**

A COMPLETE SET OF DATA DEFINITION QUALITY Checklists

❏ **For more information on how to create and assure high quality data definitions and information architecture, see *Improving Data Warehouse and Business Information Quality*, Chapter 5: "Assessing Data Definition and Information Architecture Quality," pages 83-136**

❏ **The chapter contains 22 checklists for data definition and information architecture quality including:**

- **Data standards quality**
- **Entity type name, attribute name and domain consistency**
- **Abbreviation and acronym clarity**
- **Business term, entity type, attribute and domain definition quality**
- **Business rule quality**
- **Entity to entity, attribute to entity, type subtype and entity life cycle relationship quality**
- **High level business information model, operational data model, operational database, distributed database and data warehouse model quality**

INFORMATION PRODUCT CUSTOMER SATISFACTION SURVEY

❏ **I have access to all the data I need to do my job effectively and efficiently**

(Rate on a scale of 1-10: 1 = not at all / poor: 10 = excellent)

Rating

___ **1.   I can get (or access) the data *directly***

___ **2.   I get the data *when* I need it**

___ **3.   The data values for the data I get (or access) are *complete***

___ **4.   The data is *correct* and *trustable* (I *rarely* get data that is inaccurate or whose accuracy is questionable)**

___ **5.   There are no additional data elements (facts) I need that are missing or that I cannot get**

___ **6.   The data is in an easily useable and understandable format**

___ **7.   The meaning of the data is clear to me**

___ **8.   The data enables me to be more *efficient***

___ **9.   The data enables me to be more *effective***

___ **10. The data presented in a way that is easy to use**

___ **11. What would help me do my job better is…** _____

_____

TOTAL QUALITY data MANAGEMENT (TQdM®) Methodology Overview
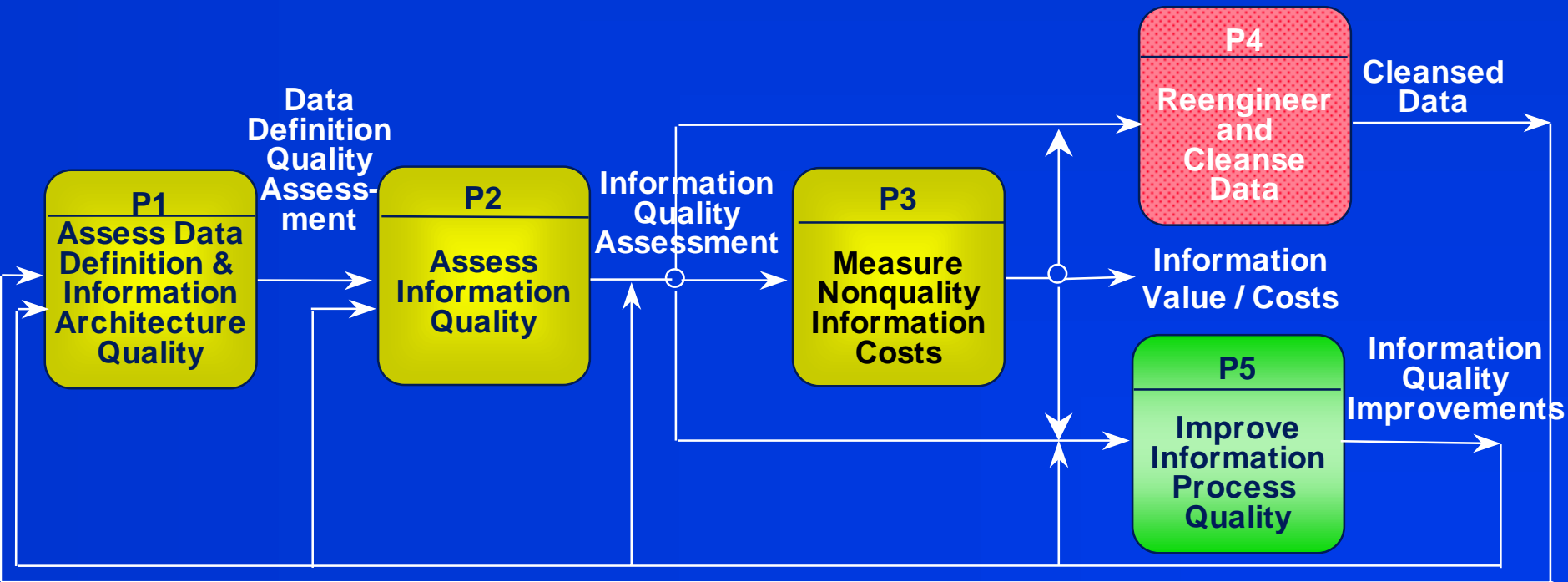
TQdM® METHODOLOGY PROCESS P2: Assess Information Quality

S1.1 →

S2.1 — ID Information Group for Assessment

S2.2 — Identify IQ Objectives and Measures

S2.3 — Identify Information Value & Cost Chain

S2.4 — Determine Files or Processes to Assess

S2.5 — Identify Data Validation Sources

S2.6 — Extract Random Sample of Data

S2.7 — Measure Information Quality

S2.8 — Interpret and Report Information Quality

Information Value & Cost Chain Diagram S3.1, S4.1, S5.1

IQ Reports S3.1, S4.1, S5.1

DATA CONTENT QUALITY MEASURES

❏ *Completeness* of data: both *kind* of data and *values*

❏ *Validity* of data as to conformance to business rules

❏ *Accuracy* of data as measured by a physical data assessment of a random sample

❏ *Precision* of data values

❏ *Non-duplication* of occurrences

❏ *Consistency* of replicated, distributed, redundantly maintained or derived data

❏ *Timeliness* of data for knowledge worker use

❏ *Rightness* of the data as measured by customer satisfaction surveys of knowledge workers and information customer "retention"

INFORMATION VALUE / COST CHAIN
Customer

Order Taker **Distri-bution** **Customer Service** **Accounts Receivable** **Marketing** **Business Planning** **Product Develop-ment**

Customer / Order Data

Create Customer **Update Customer Details** **Update Customer Details** **Inter-face** **Retrieve Customer**

Local Customer **Central Customer** **Customer Account** **Marketing Database** **Customer Warehouse**

Create data
Update/ delete data
Retrieve data

Inter-face **Inter-face** **Inter-face**

Data Cleansing & Conditioning

Information Directory

DATA MEASUREMENT AND ASSESSMENT SYSTEM
Components

Create Processes

Update Processes

Interface / Translate Processes

DD / Repository

Validation Data Source

DATA SAMPLING

Sampled Data

Data

Database Log

Redundant Data Copy

Database Log

Data Integrity Rules

Sample

Confirmed Values

Measure / Report Quality

No of Defects — % — Defect Type

Customer Verification
Customer Number
Customer Name* Correct Name
_____
Customer Address* Correct Address
_____

Update Defects — 40, 30, 20, 10, 0
Upper Control Limit
Lower Control Limit
1 2 3 4 5 6 7 8 9 10 11 12 13
Time

0839

THE INFORMATION ASSESSMENT

❏ **Conduct automated assessments for *conformance to* business rules**

- **Measure completeness**
- **Measure *validity* (domain values, ranges, derived data)**
- **Identify suspect data**
- **Identify potential duplicate records**

❏ **Conduct physical assessments for data *accuracy***

- **Compare data to data validation source**
- **Confirm potential duplicate records**

❏ **Verify consistency across all copies**

❏ **Interpret and communicate results**

❏ **Track over time to communicate progress**

⇨ **Audit without accountability is inspection only**

MEASURING INFORMATION QUALITY
Example

❑ **Customer file has 250,000 records**

❑ **Customer file data group A (highest quality standard) has 13 fields**

❑ **Random sample of 50 records selected**

❑ **Error opportunity: 13 x 50 = 650**

❑ **22 errors in 10 of the 50 records**

❑ *Record* **error percent: 10 ÷ 50 = 20%**

❑ *Field B* **error percent: 3 ÷ 50 = 6.0%**

❑ *Total* **error percent = 22 ÷ 650 = 3.4%**

❑ **EPM*: 3.4% x 1,000,000 = 34,000**

Customer Data Sample

* EPM = Errors per million

INFORMATION QUALITY SUMMARY REPORT
Reference Customer Database

IQ Next Frontier 33   © 2000, INFORMATION IMPACT International, Inc.
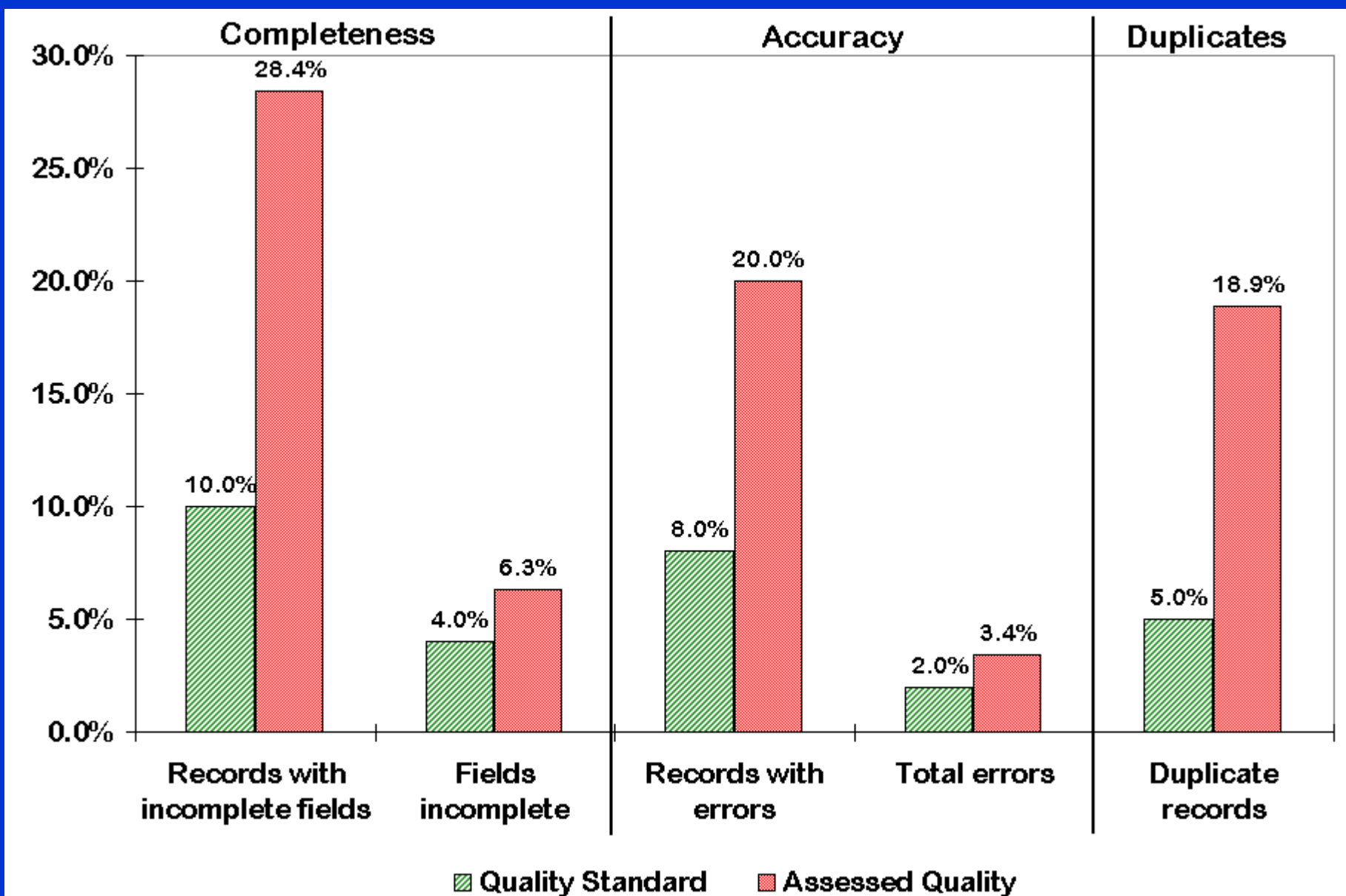
PARETO DIAGRAM
Address Errors By Type
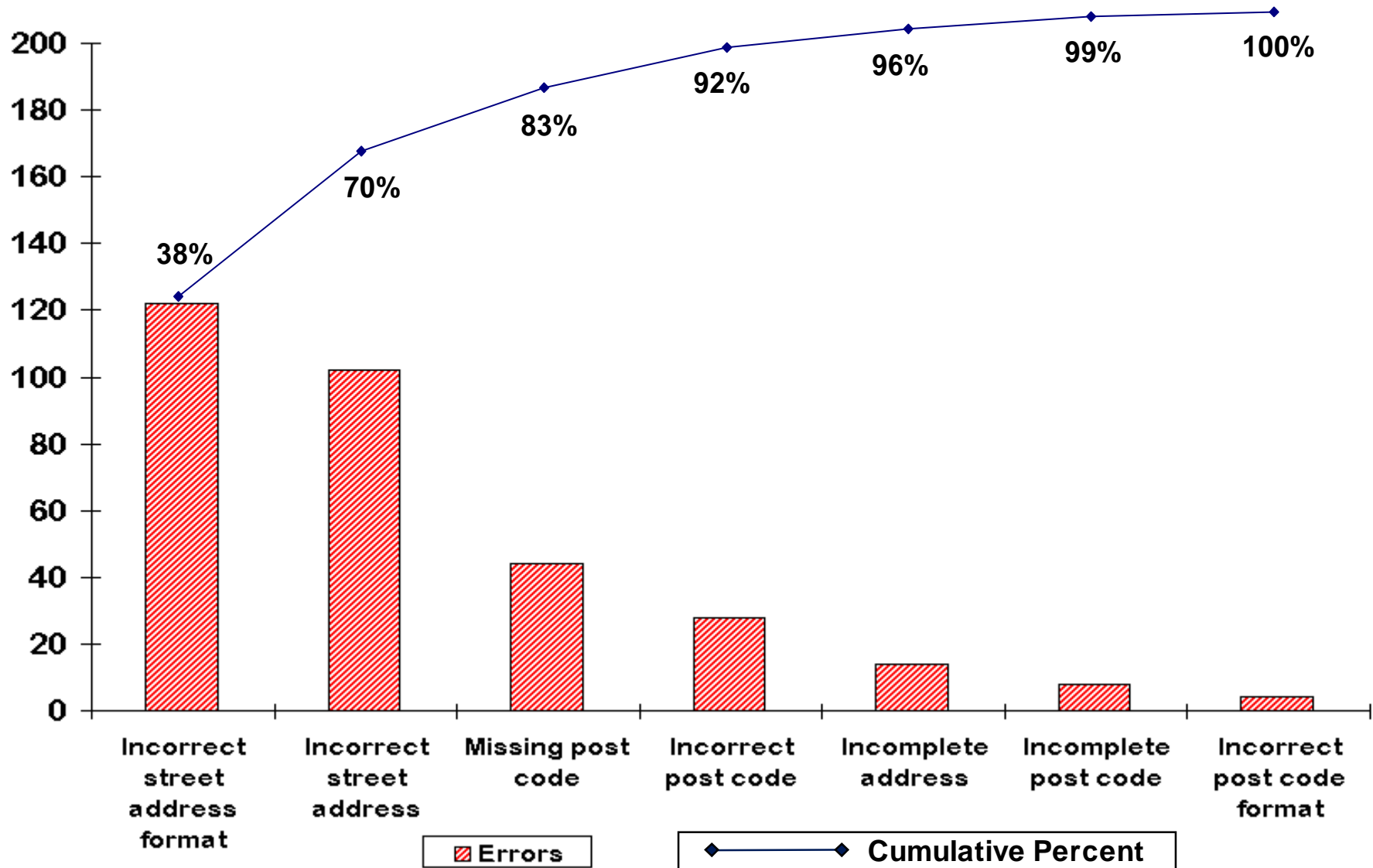
WEIGHTING ERRORS

A	B	C	D	E	F
Error Count	Error Weight Cost/yr	Weighted Result	Error Type	Total Error Cost/yr	Sample Percent of Population
61	$0.20	$12.20	Incorrect street address format	$1,220	1%
51	$5.00	$255.00	Incorrect street address	$25,500	1%
22	$2.00	$44.00	Missing post code	$4,400	1%
14	$7.50	$105.00	Incorrect post code	$10,500	1%
7	$1.00	$7.00	Incomplete address	$700	1%
4	$1.00	$4.00	Incomplete post code	$400	1%
3	$1.00	$3.00	Incorrect post code format	$300	1%
162				$43,020	Total
		(A x B)		(C ÷ F)	

❏ **Not all errors are equally "bad"**

❏ **Identify relative impact or "cost" of each error during a given period of time, e.g., quarterly or yearly**

❏ **Determine relative percent of the total population**

❏ **Multiply the number of errors times the weight and divide by the sample percent of total population**

WEIGHTED PARETO DIAGRAM
Address Error Impact

IQ Next Frontier 36
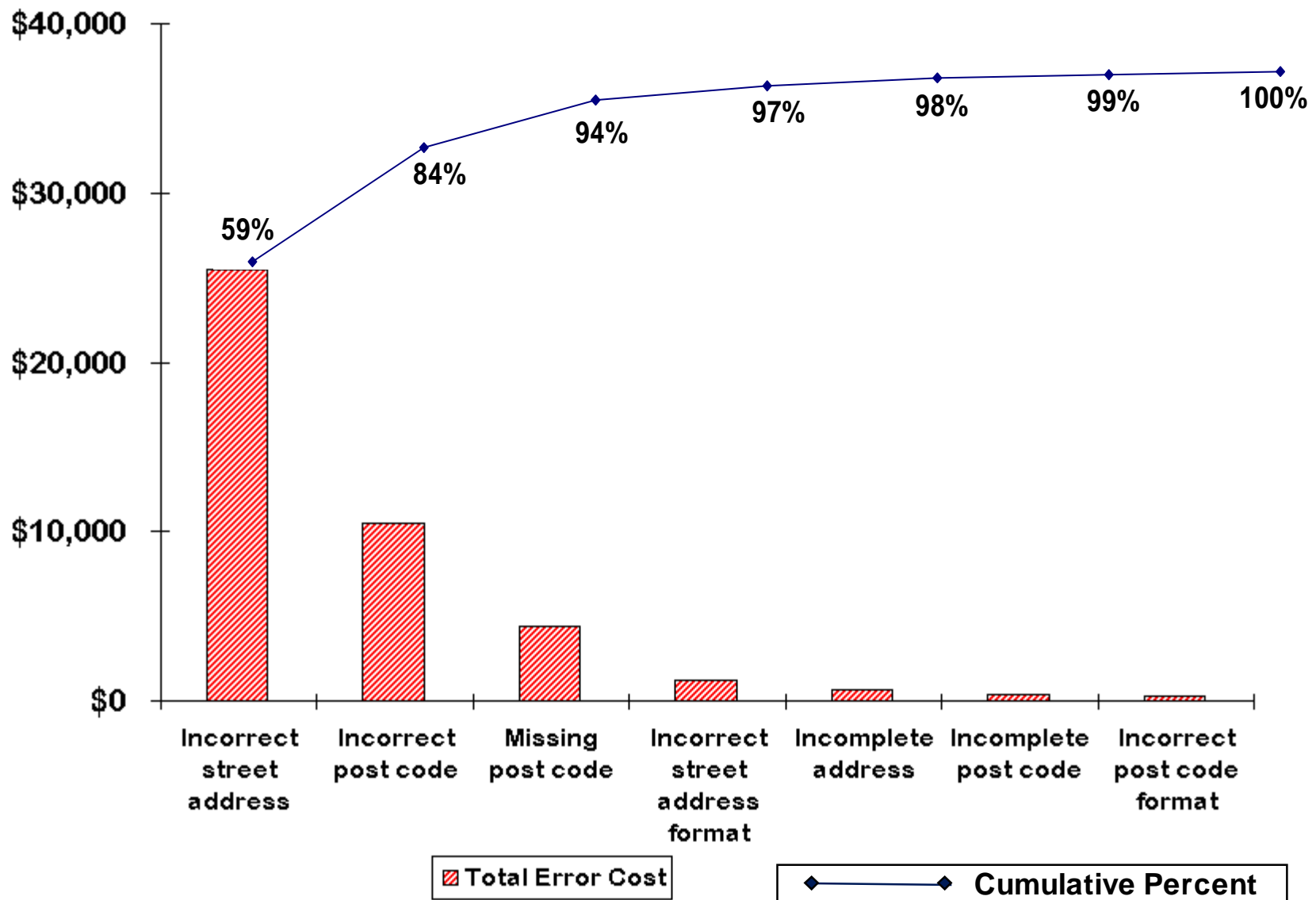
INFORMATION QUALITY CONTROL CHART
Customer Data
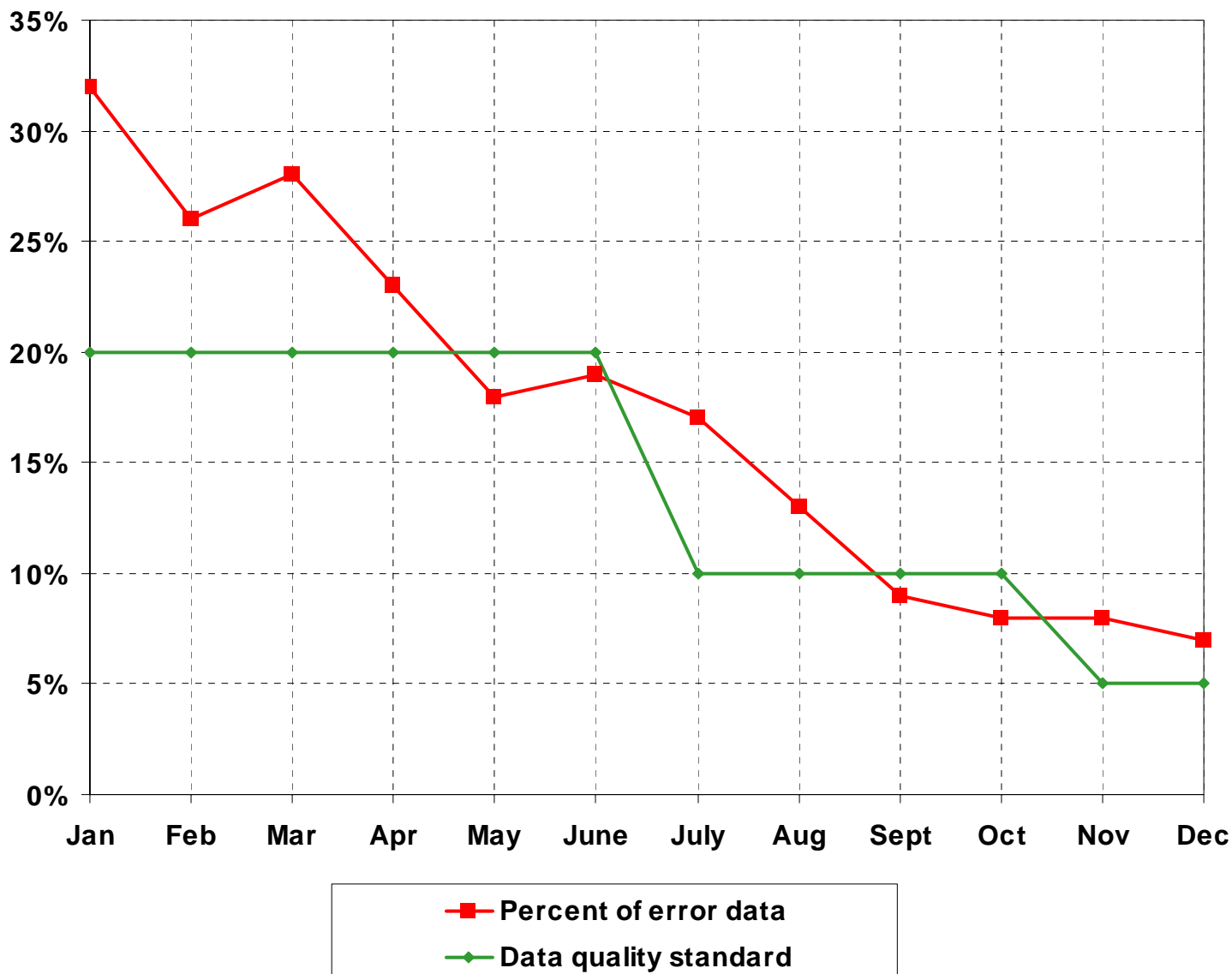
3.
Quantifying Non-Quality Information Costs
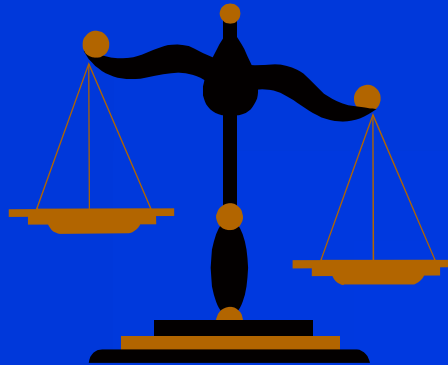
"Go slow so you can go fast."   **Japanese saying**

"The bitterness of poor quality remains long after the sweetness of low price is forgotten."
                                       Etienne C. M. van Waes, Dow Chemical

Improving Data Warehouse and Business Information Quality, **Chapter 7, pp 199 - 235**

COSTS OF NONQUALITY DATA

❑ **Costs of nonquality information (<u>process failure and</u> <u>scrap and rework</u>)**

❑ **"Losses" measured in customer lifetime value**

❑ **Mission failure**

NON-QUALITY DATA COST COMPONENTS

❏ **Time**
- **Business personnel**
- **I / S personnel**

❏ **Money**
- **Direct payments and credits**
- **Fines**
- **Future revenue lost / missed**

❏ **Materials**
- **Raw materials consumed**
- **Products scrapped**
- **Supply / support materials consumed**

❏ **Facilities and Equipment**
- **Space requirements**
- **Equipment**

❏ **Computing resources**
- **CPU cycles**
- **Network / communication**
- **Data storage**

NON-QUALITY INFORMATION COSTS
Direct Costs

Marketing Campaign	Per Instance	Number Instances	Total Number Per Year	Total cost per year
* Time: ($60/ hour loaded rate)				
- Creating redundant occurrences	2.4 min	167,141	1	$401,138
- Researching correct address	10 min	5,000/mo	12	$600,000
- Correcting address errrors	0.3 min	6,000/mo	12	$21,600
- Handling complaints from customers	5.5 min	974/yr	1	$5,357
- Mail preparation	0.1 min	393,273	4	$157,309
* Money				
- Credits to customers	--	--	--	--
- Fines	--	--	--	--
* Materials				
- Marketing brochure	$1.96	393,273	4	$3,083,260
- Postage	$0.52	393,273	4	$818,008
* Facilities and Equipment				
- Warehouse storage	$0.01	393,273	4	$15,731
- Shipping equipment maintenance	$5,000/yr	36.0%	1	$1,800
* Computing resource				
- CPU transactions	$0.02/trans	393,273	4	$31,462
- Network	--			
- Data storage	$0.001/mo	393,273	12	$4,719
- Data backup	$0.005/mo	393,273	12	$23,596
Total Annual Costs				$5,163,980

NON-QUALITY INFORMATION COSTS
Missed Opportunity Costs

Information Value	
Catalogs mailed	1,092,431
- Duplicate addresses (15.3%)	167,142
- Wrong/missing address (20.7%)	226,131
- Total catalogs "scrapped"	393,273
- Costs per catalog	$2.61
Non-recoverable costs	$1,026,443
Response rate of target customers	1.5%
Response rate of "missed" prospects	0.4%
Missed customer opportunity rate	1.1%
Misdirected catalogs	226,131
Missed first time customers	2,487
Customer lifetime value	$1,518
Missed customer lifetime value	$3,775,266

NON-QUALITY INFORMATION COSTS
Lost Opportunity Costs

Opportunity	Formula	Per Year
Total Customer Complaints		974
Customer complaints with IQ problems	49.5%	482
Ratio of complaints to "non-complaints"	1 : 26 (retail avg)	
Non-complainers with complaints	482 x 26	<u>12,532</u>
Total customers with complaints		**13,014**
Complainer attrition (of 482)	40%	193
Non-complainer attrition (of 12,532)	75%	<u>9,399</u>
Total lost customers		**9,592**
Customer lifetime value		<u>$1,518</u>
Opportunity Costs due to IQ problems		**$14,560,656**

4.
Improving Information *Product* Quality

"After the first four years, the dirt doesn't get any worse."
Quentin Crisp, *The Naked Civil Servant*

Improving Data Warehouse and Business Information Quality, Chapter 8, pp237-282

TOTAL QUALITY data MANAGEMENT (TQdM®) Methodology Overview

P6 — Establish the Information Quality Environment

P1 — Assess Data Definition & Information Architecture Quality

Data Definition Quality Assessment

P2 — Assess Information Quality

Information Quality Assessment

P3 — Measure Nonquality Information Costs

P4 — Reengineer and Cleanse Data

Cleansed Data

Information Value / Costs

P5 — Improve Information Process Quality

Information Quality Improvements
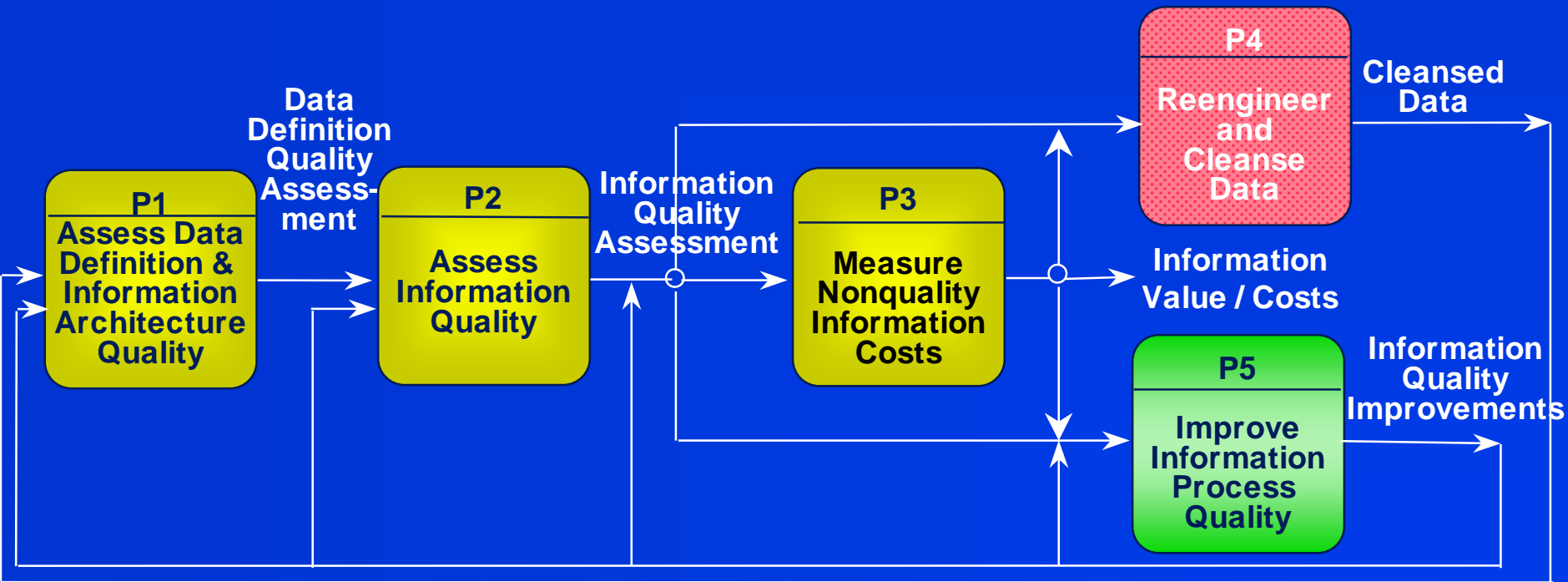
DATA REENGINEERING / CLEANSING PROCESS

4.1 Identify Data Sources

Extract

Legacy Source Data

4.2 Extract & Analyze Source Data

Legacy Source Data

4.3 Standardize Data

Design Data Warehouse

4.4 Correct and Complete Data

Cleansed data

4.5 Match and Consolidate Data

Data Warehouse

Rules Repository

4.7 Transform / Enhance Data into Target

4.8 Calculate Derived & Summary Data

Audit Database

4.6 Analyze Defect Types

4.9 Audit & Control Data Extract Transform & Loading

INFORMATION QUALITY IN THE DATA WAREHOUSE

❑ **Solves *strategic business* problems**
❑ **Think and plan big, start small, incremental**
❑ **Analyze legacy data to discover "*hidden*" data**
❑ ***Enterprise consensus* data models and definitions**
❑ **Business information stewards validate data definition**
❑ **Information directory / data definition availability**
❑ **Data quality measured and corrected at the source**
   ➢**If *not* correctable, measure and post its quality**
❑ **Data assessments used to correct data defect *cause***
❑ **Changed performance measures and incentives**
❑ **Data managed at the source and detail level**
❑ **Highly automated and controlled ECTL processes**
❑ **Regular customer satisfaction surveys**
⇨ **Data model and definitions *re-used* for reengineering**

5.
Improving Information *Process* Quality

"It is a funny thing about life; if you refuse to accept anything but the best, you very often get it."   **Somerset Maugham, English novelist & dramatist**

"There is absolutely no reason for having errors or defects in any product or service."   **P. B. Crosby**

"Measure twice, cut once."   **Carpenter's Rule of Thumb**

Improving Data Warehouse and Business Information Quality, Chapter 9, pp285-310

TOTAL QUALITY data MANAGEMENT (TQdM®)
Methodology Overview

P6

Establish the Information Quality Environment

P1 — **Assess Data Definition & Information Architecture Quality**

Data Definition Quality Assessment

P2 — **Assess Information Quality**

Information Quality Assessment

P3 — **Measure Nonquality Information Costs**

P4 — **Reengineer and Cleanse Data**

Cleansed Data

Information Value / Costs

P5 — **Improve Information Process Quality**

Information Quality Improvements
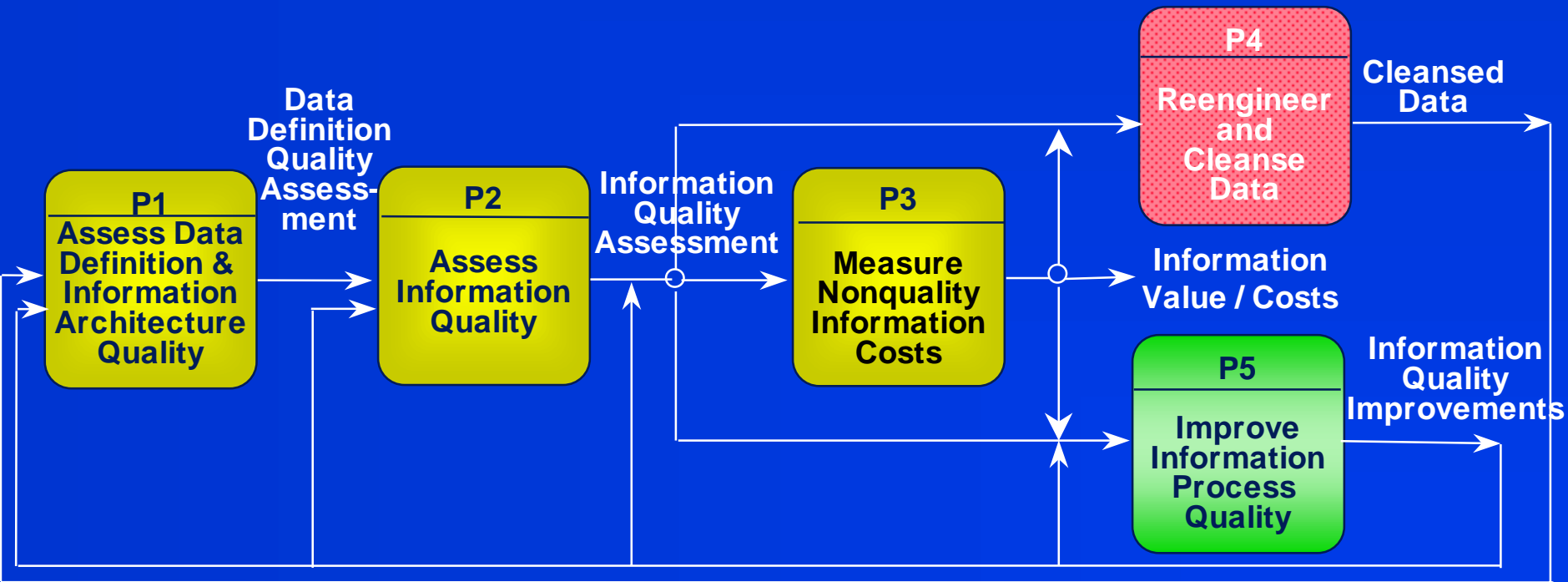
TQdM® METHODOLOGY
PROCESS P5:
Improve Information Process Quality

S1.4, 5, 6
S2.3, 8
S3.6
S4.6

S5.1	S5.2	S5.3
Select Process for Information Quality Improvement	**Develop *Plan* for Information Quality Improvement**	***Do* Implement Quality Improve-ments**

S5.5		S5.4
***Act* to Standardize Information Quality Improvements**		***Check* Impact of Information Quality Improvements**

4 ACT	1 PLAN
3 CHECK	2 DO

Information Quality Improvements

Plan-Do-Check-Act (PDCA)
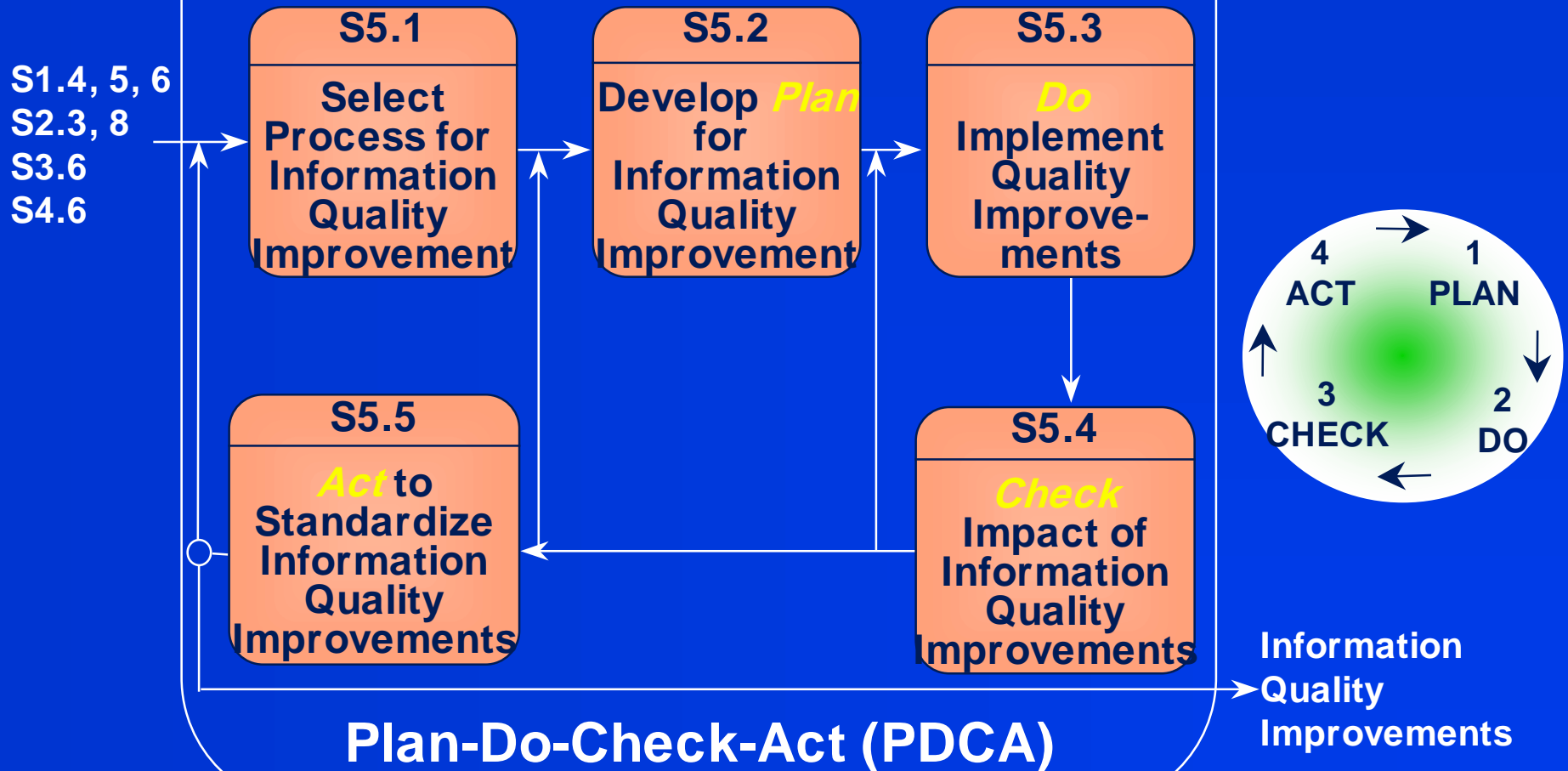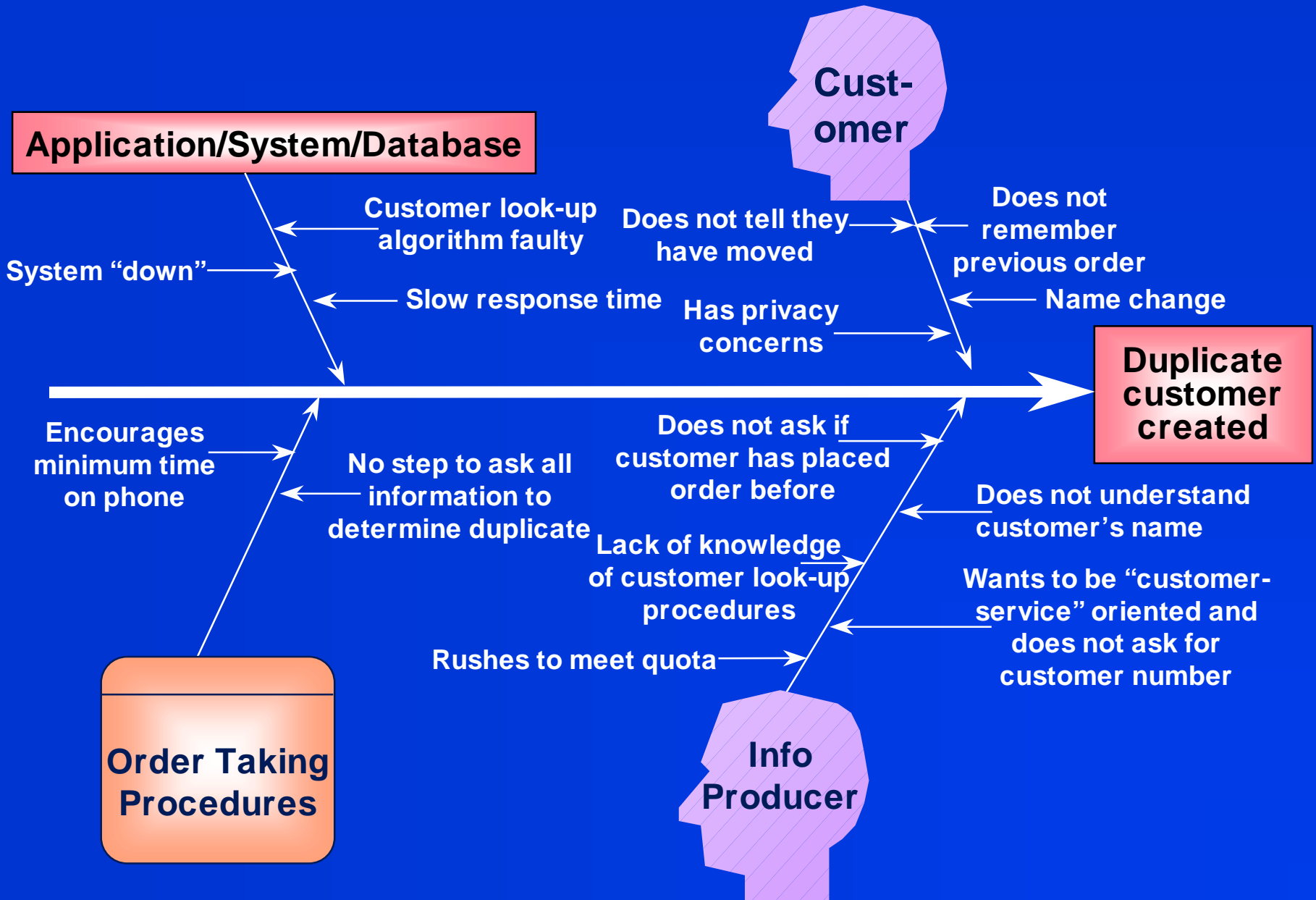
CAUSE-AND-EFFECT DIAGRAM
Principles

⇨ **Solution-focused, non-blame, non-judgmental atmosphere**

⇨ **Defective data means the *process* is broken, not the *people***

❏ **Describe the effect clearly**

❏ **Everyone must participate**

❏ **Do not criticize ideas or suggested causes**

❏ **Go for visibility, so all can see**

❏ **Group causes together as they are mentioned**

❏ **Do not overload a diagram**

❏ **Circle the most likely causes *after* all ideas listed**

❏ **Understand each cause**

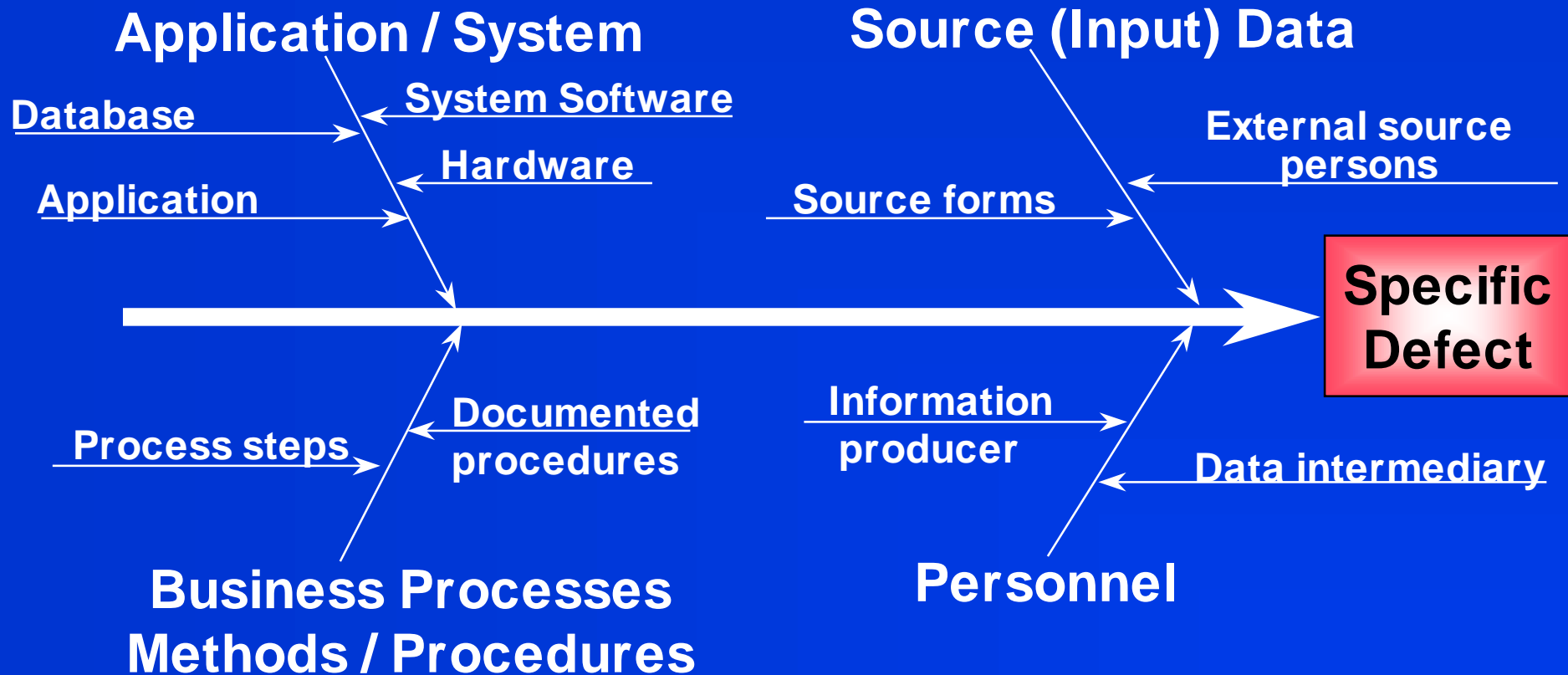❏ **Maintain diagrams**

Source: *Kaizen*, BBC Training Videos

CAUSE-AND-EFFECT DIAGRAM
Order Entry Errors

Application/System/Database

Cust-omer

Customer look-up algorithm faulty

Does not tell they have moved

Does not remember previous order

System "down"

Slow response time

Name change

Has privacy concerns

Duplicate customer created

Encourages minimum time on phone

No step to ask all information to determine duplicate

Does not ask if customer has placed order before

Does not understand customer's name

Lack of knowledge of customer look-up procedures

Wants to be "customer-service" oriented and does not ask for customer number

Rushes to meet quota

Order Taking Procedures

Info Producer

CAUSE-AND-EFFECT DIAGRAM
For Information Quality
(Business Process Quality)

Application / System

Source (Input) Data

Database

System Software

Hardware

Application

External source persons

Source forms

Specific Defect

Documented procedures

Information producer

Process steps

Data intermediary

Business Processes Methods / Procedures

Personnel

6.
Implementing and Sustaining an Information Quality Improvement Environment

"Success is a journey, not a destination"

"Quality is free. But it is not a gift" . . . . . P. B. Crosby

Improving Data Warehouse and Business Information Quality, Chapter 13, pp 421 - 454

1. **Create constancy of purpose for improvement of *information* product and service: The obligation to the knowledge worker never ceases**

2. **Adopt the new philosophy of quality *shared data* as a tool for business improvement: "Reliable shared information reduces costs"**

   - **This means a transformation of I / S and business management**

3. **Cease reliance on data and application inspections alone to achieve information quality: Design quality into data design and data production processes and establish management accountability**

4. **End the practice of developing applications on the basis of "on-time," "within budget" measures alone and capturing data at the lowest cost: Develop single data creation programs as the authoritative source**

5. **Improve constantly and forever the process of application and data development and data production and service: Implement a plan-do-check-act process for information quality improvement**

6. **Institute training on information quality for all employees, especially information producers**

7. **Institute leadership for information quality: appoint a full-time information quality leader**

8. **Drive out fear of data uncertainty or data correction: Implement incentive programs for finding / and correcting problem causes**

9. **Break down barriers between business areas: information management and application development; IT and business; business area and business area units**
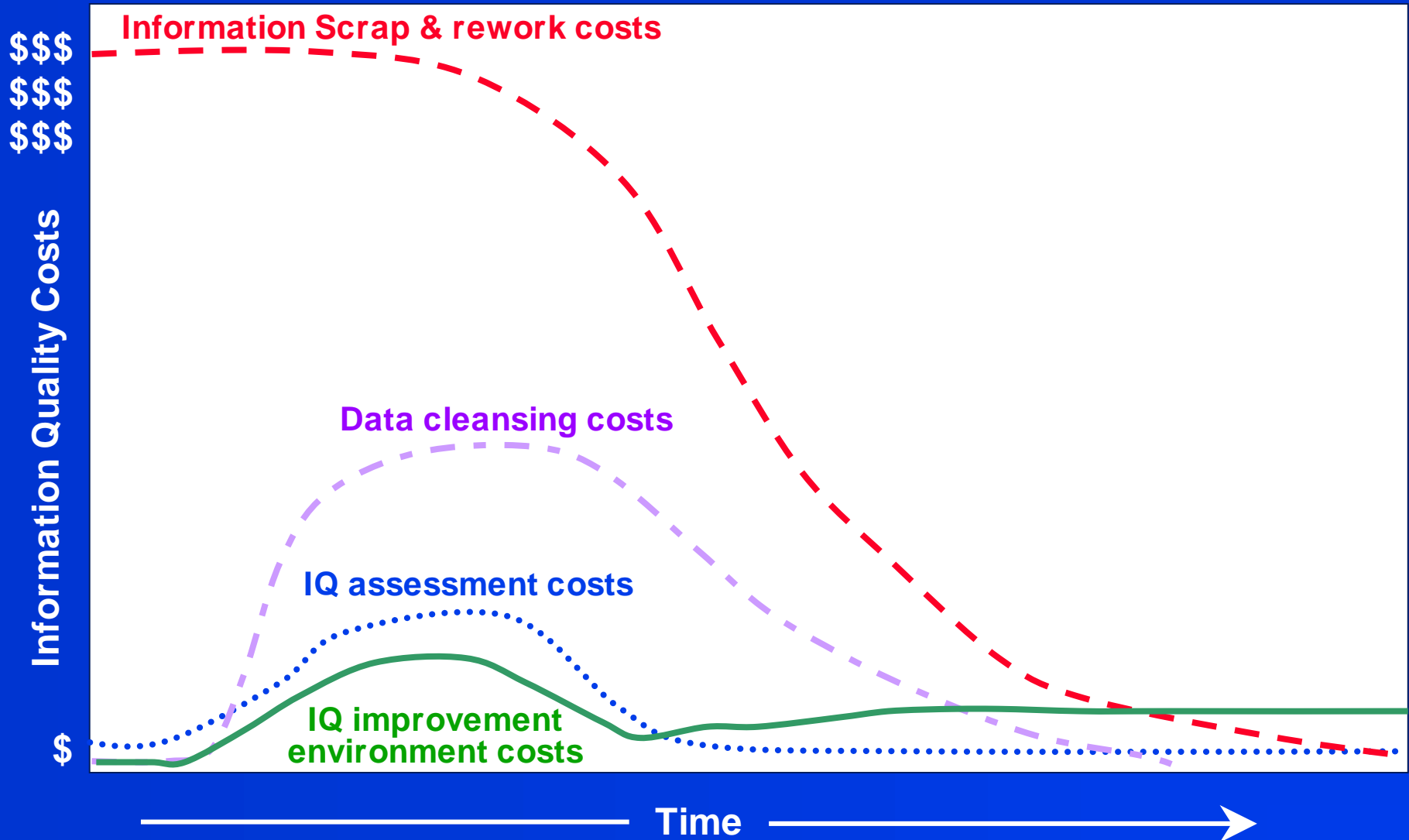
* Adapted from Deming's 14 Points

10. **Eliminate slogans and exhortations, and replace with actions for information quality improvement: develop a habit of data "defect prevention"**

11. **Eliminate quotas of "productivity" with quality metrics: Customer satisfaction of information products**

12. **Remove barriers to pride of workmanship; allow information producers to fix the problems in the processes**

13. **Encourage education and self-improvement for all people in the information value chain: understand the paradigm shift and learn tomorrow's skills**

14. **Take action to accomplish the transformation for information quality: Senior management must feel the pain of the status quo and must communicate to a critical mass of people the need for change**

* Adapted from Deming's 14 Points

INFORMATION MANAGEMENT MATURITY AND COSTS OF QUALITY

Information Scrap & rework costs

Data cleansing costs

IQ assessment costs

IQ improvement environment costs

Information Quality Costs

$$$
$$$
$$$

$

Time

HOW TO START A TQdM® PROGRAM

❏ **Revisit / revise the information management mission**

❏ **Identify and empower an information quality leader**

❏ **Conduct a "customer" survey**

❏ **Set up an IQ problem "hotline" and broadcast**

❏ **Develop *inventory* and *value* chain of select critical data**

❏ **Conduct quality assessment of select critical data**

❏ **Analyze customer complaints with information problems**

❏ **Quantify the costs of nonquality data**

❏ **Develop rapport and support of change sponsor**

❏ **Get information producers and knowledge workers together**

❏ **Conduct a pilot information quality improvement project: measure and communicate benefits**

❏ **Provide education to all information stakeholders**

"Quality is free. It's not a gift, but it is free. What costs money are the unquality things–all the actions that involve not doing jobs right the first time.

"Quality is not only free, it is an honest-to-everything profit maker. Every penny you don't spend on doing things wrong, over, or instead becomes half a penny right on the bottom line. If you concentrate on making quality certain you can probably increase your profit by an amount equal to 5 to 10 percent of your sales. That is a lot of money for free."

Philip B. Crosby, *Quality Is Free*

To re-iterate:

"QUALITY IS FREE. IT'S NOT A GIFT..."

Thank you for your valuable time. Please share your feedback and comments as you apply your new knowledge.

Larry English

For more information about information quality and information quality resources, readings in information management, to contact us, or to order the book, explore our web site:

www.infoimpact.com